

Journal of Computational Physics



Volume 102, 1992

ACADEMIC PRESS, INC.

Harcourt Brace Jovanovich, Publishers

San Diego New York Boston London Sydney Tokyo Toronto

Copyright © 1992 by Academic Press, Inc.
All Rights Reserved

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the copyright owner.

The appearance of the code at the bottom of the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made for personal or internal use, or for the personal or internal use of specific clients. This consent is given on the condition, however, that the copier pay the stated per copy fee through the Copyright Clearance Center, Inc. (27 Congress Street, Salem, Massachusetts 01970), for copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale. Copy fees for pre-1992 articles are as shown on the article title pages; if no fee code appears on the title page, the copy fee is the same as for current articles.

0021-9991/92 \$5.00

This journal is printed on acid-free paper.



Printed by Catherine Press, Ltd., Brugge, Belgium

Contents of Volume 102

Number 1, September 1992

REVIEW ARTICLE

1 Numerical Modeling of Macro and Micro Behaviors of Materials in Processing: A Review
A. A. Tseng, J. Zou, H. P. Wang, and S. R. H. Hoole

REGULAR ARTICLES

18 Octopus: An Efficient Phase Space Mapping for Light Particles
David A. Kosower

39 A Comparison of Particle-in-Cell and Fokker-Planck Methods as Applied to the Modeling of Auxiliary-Heated Mirror Plasmas

Richard J. Procassini and Bruce I. Cohen

49 On the Suppression of Numerical Oscillations Using a Non-Linear Filter
W. Shyy, M.-H. Chen, R. Mittal, and H. S. Udaykumar

63 A Numerical Solution Method for Boundary Value Problems Containing an Undetermined Parameter
P. A. Ramachandran

72 A Finite Difference Procedure for a Class of Free Boundary Problems
Bengt Fornberg and Rita Meyer-Spasche

78 Orthogonal Grid Generation in a 2D Domain via the Boundary Integral Technique
I. S. Kang and L. G. Leal

88 Spectral Methods in Time for a Class of Parabolic Partial Differential Equations
Glenn Ierley, Brian Spencer, and Rodney Worthing

98 Global and Local Remeshing Algorithms for Compressible Flows
C. J. Hwang and S. J. Wu

114 Adaptive Spectral Methods with Application to Mixing Layer Computations
H. Guillard, J. M. Malé, and R. Peyret

128 Projection Methods Coupled to Level Set Interface Techniques
Jingyi Zhu and James Sethian

139 A Comparative Study of Advanced Shock-Capturing Schemes Applied to Burgers' Equation
H. Q. Yang and A. J. Przekwas

160 A Computer Model for One-Dimensional Mass and Energy Transport in and around Chemically Reacting Particles, Including Complex Gas-Phase Chemistry, Multicomponent Molecular Diffusion, Surface Evaporation, and Heterogeneous Reaction

S. Y. Cho, R. A. Yetter, and F. L. Dryer

180 A Fluid-Ion and Particle-Electron Model for Low-Frequency Plasma Instabilities
P. M. Lyster and J.-N. Leboeuf

194 Implicit Flux Limiting Schemes for Petroleum Reservoir Simulation
Martin Blunt and Barry Rubin

211 A Standard Test Set for Numerical Approximations to the Shallow Water Equations in Spherical Geometry
David L. Williamson, John B. Drake, James J. Hack, Rüdiger Jakob, and Paul N. Swarztrauber

ABSTRACTS OF PAPERS TO APPEAR IN FUTURE ISSUES

Number 2, October 1992

227 Elimination of Velocity-Space Rings-and-Spokes Instabilities in Magnetized Electrostatic Particle Simulations of Plasmas

Niels F. Otani, Jin-Soo Kim, Charles K. Birdsall, Bruce I. Cohen, William McCay Nevins, and Neil Maron

236 **Absorbing Boundary Conditions, Difference Operators, and Stability**
R. A. Renaut

252 **Computation of the Direct Scattering Transform for the Nonlinear Schrödinger Equation**
G. Boffetta and A. R. Osborne

265 **Efficient yet Accurate Solution of the Linear Transport Equation in the Presence of Internal Sources: The Exponential-Linear-in-Depth Approximation**
Arve Kylling and Knut Stamnes

277 **A Vlasov Particle Ion Zero Mass Electron Model for Plasma Simulations**
F. Kazeminezhad, J. M. Dawson, J. N. Leboeuf, R. Sydora, and D. Holland

297 **Numerical Solution of a Free-Boundary Problem in Hypersonic Flow Theory: Nonequilibrium Viscous Shock Layers**
Bruno Laboudigue, Vincent Giovangigli, and Sébastien Candel

310 **A Spectral Multigrid Method for the Stokes Problem in Streamfunction Formulation**
Wilhelm Heinrichs

319 **A Split-Matrix Runge-Kutta Type Space Marching Procedure**
C. Weiland

336 **Approximate Factorization as a High Order Splitting for the Implicit Incompressible Flow Equations**
John K. Dukowicz and Arkady S. Dvinsky

348 **On the Implementation of the GMRES(m) Method to Elliptic Equations in Meteorology**
Mikdat Kadioğlu and Stephen Mudrick

360 **A Weak Formulation of Roe's Approximate Riemann Solver**
I. Toumi

374 **Extraction of Accurate Frequencies from the Fast Fourier Transform Spectra**
Kazuo Takatsuka

381 **Communication Efficient Multi-processor FFT**
S. Lennart Johnsson, Michel Jacquemin, and Robert L. Krawitz

398 **An Adaptive Algorithm for Spectral Computations on Unbounded Domains**
A. Cloot and J. A. C. Weideman

407 **The Numerical Study of Blowup with Application to a Nonlinear Schrödinger Equation**
Y. Tourigny and J. M. Sanz-Serna

NOTE

417 **Comparison between 1D and $1\frac{1}{2}$ D Eulerian Vlasov Codes for the Numerical Simulation of Stimulated Raman Scattering**
A. Ghizzo, P. Bertrand, J. Lebas, M. Shoucri, T. Johnston, E. Fijalkow, and M. R. Feix

423 **ANNOUNCEMENT**

424 **ABSTRACTS OF PAPERS TO APPEAR IN FUTURE ISSUES**

426 **AUTHOR INDEX FOR VOLUME 102**